ANNEX 1 Key Category Analysis

The United States has identified national key categories based on the estimates presented in this report. The IPCC's *Good Practice Guidance* (IPCC 2000) describes a key category as a "[category] that is prioritized within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both."[1] By definition, key categories are sources or sinks that have the greatest contribution to the absolute overall level of national emissions in any of the years covered by the time series. In addition, when an entire time series of emission estimates is prepared, a determination of key categories must also account for the influence of the trends of individual categories. Therefore, a trend assessment is conducted to identify source and sink categories for which significant uncertainty in the estimate would have considerable effects on overall emission trends. Finally, a qualitative evaluation of key categories should be performed, in order to capture any key categories that were not identified in either of the quantitative analyses, but can be considered key because of the unique country-specific estimation methods.

The methodology for conducting a key category analysis, as defined by IPCC's *Good Practice Guidance* (IPCC 2000) and IPCC's *Good Practice Guidance for Land Use, Land-Use Change, and Forestry (IPCC 2003)*, includes:

- Tier 1 approach (including both level and trend assessments);
- Tier 2 approach (including both level and trend assessments, and incorporating uncertainty analysis); and
- Qualitative approach.

This Annex presents an analysis of key categories, both for sources only and also for sources and sinks (i.e., including LULUCF); discusses Tier 1, Tier 2, and qualitative approaches to identifying key categories; provides level and trend assessment equations; and provides a brief statistical evaluation of IPCC's quantitative methodologies for defining key categories.

Table A-1 presents the key categories for the United States based on the Tier 1 approach (including and not including LULUCF categories) using emissions data in this report, and ranked according to their sector and global warming potential-weighted emissions in 2005. The table also indicates the criteria used in identifying these source and sink categories (i.e., level, trend, and/or qualitative assessments).

Table A-1: Key Source Categories for the United States (1990-2005) Based on Tier 1 Approach

IPCC Source Categories	Gas	Level Without LULUCF	Trend Without LULUCF	Level With LULUCF	Trend With LULUCF	Qual[a]	2005 Emissions (Tg CO_2 Eq.)
Energy							
CO_2 Emissions from Stationary Combustion – Coal	CO_2	✓	✓	✓	✓		2,093.6
Mobile Combustion: Road & Other	CO_2	✓	✓	✓	✓		1,642.9
CO_2 Emissions from Stationary Combustion – Gas	CO_2	✓		✓			1,138.2
CO_2 Emissions from Stationary Combustion – Oil	CO_2	✓	✓	✓	✓		626.3
Mobile Combustion: Aviation	CO_2	✓	✓	✓	✓		186.1
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	✓		✓	✓		142.4
Fugitive Emissions from Natural Gas Systems	CH_4	✓	✓	✓	✓		111.1
International Bunker Fuels[b]	Several					✓	98.2
Mobile Combustion: Marine	CO_2	✓	✓	✓	✓		63.7
Fugitive Emissions from Coal Mining	CH_4	✓	✓	✓	✓		52.4
Fugitive Emissions from Petroleum Systems	CH_4	✓	✓	✓	✓		28.5

CO_2 Emissions from Natural Gas Systems	CO_2	✓	✓	✓	✓	28.2
CO_2 Emissions from Waste Combustion	CO_2		✓		✓	20.9
Mobile Combustion: Road and Other	N_2O	✓	✓	✓	✓	13.8
Industrial Processes						
Emissions from Substitutes for Ozone Depleting Substances	Several	✓	✓	✓	✓	123.3
CO_2 Emissions from Cement Manufacture	CO_2	✓	✓	✓	✓	45.9
CO_2 Emissions from Iron and Steel Production	CO_2	✓	✓	✓	✓	45.2
HFC-23 Emissions from HCFC-22 Manufacture	HFCs	✓	✓	✓	✓	16.5
CO_2 Emissions from Ammonia Manufacture and Urea Application	CO_2		✓		✓	16.3
SF_6 Emissions from Electrical Transmission and Distribution	SF_6		✓		✓	13.2
N_2O Emissions from Adipic Acid Production	N_2O		✓		✓	6.0
PFC Emissions from Aluminum Production	PFCs		✓		✓	3.0
Agriculture						
Direct N_2O Emissions from Agricultural Soils	N_2O	✓	✓	✓	✓	310.5
CH_4 Emissions from Enteric Fermentation in Domestic Livestock	CH_4	✓	✓	✓	✓	112.1
Indirect N_2O Emissions from Nitrogen Used in Agriculture	N_2O	✓	✓	✓	✓	54.6
CH_4 Emissions from Manure Management	CH_4			✓		9.5
Waste						
CH_4 Emissions from Landfills	CH_4	✓	✓	✓	✓	132.0
Land Use, Land-Use Change, and Forestry						
CO_2 Emissions from Forest Land Remaining Forest Land	CO_2			✓		(698.7)
CO_2 Emissions from Settlements Remaining Settlements	CO_2			✓	✓	(88.5)
CO_2 Emissions from Cropland Remaining Cropland	CO_2			✓	✓	(39.4)
CO_2 Emissions from Grassland Remaining Grassland	CO_2				✓	16.1
CO_2 Emissions from Landfilled Yard Trimmings and Food Scraps	CO_2				✓	(8.8)
Subtotal Without LULUCF						7,036.4
Total Emissions Without LULUCF						7,241.5
Percent of Total Without LULUCF						97.2%
Subtotal With LULUCF						6,217.0
Total Emissions With LULUCF						6,431.9
Percent of Total With LULUCF						96.7%

[a]Qualitative criteria.

[b]Emissions from this source not included in totals.

Note: The Tier 1 approach for identifying key source categories does not directly include assessment of uncertainty in emissions estimates.

Table A-2 provides a complete listing of source categories by IPCC sector, along with comments on the criteria used in identifying key categories, without LULUCF sources and sinks. Similarly, Table A-3 provides a complete listing of source and sink categories by IPCC sector, along with comments on the criteria used in identifying key categories, including LULUCF sources and sinks. The comments refer specifically to the year(s) over the course of the entire inventory time series (i.e., 1990 to 2005) in which each source category reached the threshold for being a key source based on a Tier 1 level assessment.

In addition to conducting Tier 1 level and trend assessments, a qualitative assessment of the source and sink categories, as described in the IPCC's *Good Practice Guidance* (IPCC 2000), was conducted to capture any key categories that were not identified by either quantitative method. One additional key category, international bunker fuels, was identified using this qualitative assessment. International bunker fuels are fuels consumed for aviation or marine international transport activities, and emissions from these fuels are reported separately from totals in accordance with IPCC guidelines. If these emissions were included in the totals, bunker fuels would qualify as a

key category according to the Tier 1 approach. The amount of uncertainty associated with estimation of emissions from international bunker fuels also supports the qualification of this source category as key.

Following the text of this Annex, Table A-3 through Table A- 7 contain the 1990 and 2005 level assessments for both with and without LULCF sources and sinks, and contain further detail on where each source falls within the analysis. Table A- 8 and Table A- 9 detail the "with LULUCF" and "without LULUCF" trend assessments for 1990 through 2005.

Table A-2: U.S Greenhouse Gas Inventory Source Categories without LULUCF

IPCC Source Categories	Direct GHG	2005 Emissions (Tg CO_2 Eq.)	Key Category Flag?	ID Criteria	Comments
Energy					
CO_2 Emissions from Stationary Combustion - Coal	CO_2	2,093.6	✓	L,T	Level in 1990 and 2005
Mobile Combustion: Road & Other	CO_2	1,642.9	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Stationary Combustion - Gas	CO_2	1,138.2	✓	L	Level in 1990 and 2005
CO_2 Emissions from Stationary Combustion - Oil	CO_2	626.3	✓	L,T	Level in 1990 and 2005
Mobile Combustion: Aviation	CO_2	186.1	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	142.4	✓	L	Level in 1990 and 2005
Mobile Combustion: Marine	CO_2	63.7	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Natural Gas Systems	CO_2	28.2	✓	L,T	Level in 1990
CO_2 Emissions from Waste Combustion	CO_2	20.9	✓	T	
CO_2 Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4			
Fugitive Emissions from Natural Gas Systems	CH_4	111.1	✓	L,T	Level in 1990 and 2005
Fugitive Emissions from Coal Mining	CH_4	52.4	✓	L,T	Level in 1990 and 2005
Fugitive Emissions from Petroleum Systems	CH_4	28.5	✓	L,T	Level in 1990
Non-CO_2 Emissions from Stationary Combustion	CH_4	6.9			
Fugitive Emissions from Abandoned Coal Mines	CH_4	5.5			
Mobile Combustion: Road & Other	CH_4	2.4			
Mobile Combustion: Aviation	CH_4	0.1			
Mobile Combustion: Marine	CH_4	0.1			
Mobile Combustion: Road & Other	N_2O	35.7	✓	L,T	Level in 1990
Non-CO_2 Emissions from Stationary Combustion	N_2O	13.8			
Mobile Combustion: Aviation	N_2O	1.8			
Mobile Combustion: Marine	N_2O	0.5			
N_2O Emissions from Waste Combustion	N_2O	0.4			
International Bunker Fuels[a]	Several	98.2	✓	Q	
Industrial Processes					
CO_2 Emissions from Cement Manufacture	CO_2	45.9	✓	L,T	Level in 2005
CO_2 Emissions from Iron and Steel Production	CO_2	45.2	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Ammonia Manufacture and Urea Application	CO_2	16.3	✓	T	
CO_2 Emissions from Lime Manufacture	CO_2	13.7			
CO_2 Emissions from Limestone and Dolomite Use	CO_2	7.4			
CO_2 Emissions from Aluminum Production	CO_2	4.2			
CO_2 Emissions from Soda Ash Manufacture and Consumption	CO_2	4.2			
CO_2 Emissions from Petrochemical Production	CO_2	2.9			
CO_2 Emissions from Titanium Dioxide Production	CO_2	1.9			
CO_2 Emissions from Phosphoric Acid Production	CO_2	1.4			
CO_2 Emissions from Ferroalloy Production	CO_2	1.4			
CO_2 Emissions from CO_2 Consumption	CO_2	1.3			
CO_2 Emissions from Zinc Production	CO_2	0.5			

CO_2 Emissions from Lead Production	CO_2	0.3			
CO_2 Emissions from Silicon Carbide Production and Consumption	CO_2	0.2			
CH_4 Emissions from Petrochemical Production	CH_4	1.1			
CH_4 Emissions from Iron and Steel Production	CH_4	1.0			
CH_4 Emissions from Silicon Carbide Production and Consumption	CH_4	+			
CH_4 Emissions from Ferroalloy Production	CH_4	+			
N_2O Emissions from Nitric Acid Production	N_2O	15.7			
N_2O Emissions from Adipic Acid Production	N_2O	6.0	✓	T	
N_2O Emissions from N_2O Product Usage	N_2O	4.3			
Emissions from Substitutes for Ozone Depleting Substances	HiGWP	123.3	✓	L,T	Level in 2005
HFC-23 Emissions from HCFC-22 Production	HiGWP	16.5	✓	L,T	Level in 1990
SF_6 Emissions from Electrical Transmission and Distribution	HiGWP	13.2	✓	T	
PFC, HFC, and SF_6 Emissions from Semiconductor Manufacture	HiGWP	4.3			
PFC Emissions from Aluminum Production	HiGWP	3.0	✓	T	
SF_6 Emissions from Magnesium Production and Processing	HiGWP	2.7			
Agriculture					
CH_4 Emissions from Enteric Fermentation in Domestic Livestock	CH_4	112.1	✓	L,T	Level in 1990 and 2005
CH_4 Emissions from Manure Management	CH_4	41.3			
CH_4 Emissions from Rice Cultivation	CH_4	6.9			
CH_4 Emissions from Field Burning of Agricultural Residues	CH_4	0.9			
Direct N_2O Emissions from Agricultural Soil Management	N_2O	310.5	✓	L,T	Level in 1990 and 2005
Indirect N_2O Emissions from Applied Nitrogen	N_2O	54.6	✓	L,T	Level in 1990 and 2005
N_2O Emissions from Manure Management	N_2O	9.5			
N_2O Emissions from Field Burning of Agricultural Residues	N_2O	0.5			
Waste					
CH_4 Emissions from Landfills	CH_4	132.0	✓	L,T	Level in 1990 and 2005
CH_4 Emissions from Wastewater Treatment	CH_4	25.4			
N_2O Emissions from Wastewater Treatment	N_2O	8.0			

[a] Emissions from these sources not included in totals.
+ Does not exceed 0.05 Tg CO_2 Eq.
Note: LULUCF sources and sinks are not included in this analysis.
Note: The Tier 1 approach for identifying key categories does not directly include assessment of uncertainty in emission estimates.

Table A-3: U.S Greenhouse Gas Inventory Source Categories with LULUCF

IPCC Source Categories	Direct GHG	2005 Emissions (Tg CO_2 Eq.)	Key Source Category Flag?	ID Criteria	Comments
Energy					
CO_2 Emissions from Stationary Combustion - Coal	CO_2	2,093.6	✓	L,T	Level in 1990 and 2005
Mobile Combustion: Road & Other	CO_2	1,642.9	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Stationary Combustion - Gas	CO_2	1,138.2	✓	L	Level in 1990 and 2005
CO_2 Emissions from Stationary Combustion - Oil	CO_2	626.3	✓	L,T	Level in 1990 and 2005
Mobile Combustion: Aviation	CO_2	186.1	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	142.4	✓	L,T	Level in 1990 and 2005
Mobile Combustion: Marine	CO_2	63.7	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Natural Gas Systems	CO_2	28.2	✓	L,T	Level in 1990
CO_2 Emissions from Waste Combustion	CO_2	20.9	✓	T	
CO_2 Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4			

Fugitive Emissions from Natural Gas Systems	CH_4	111.1	✓	L,T	Level in 1990 and 2005
Fugitive Emissions from Coal Mining	CH_4	52.4	✓	L,T	Level in 1990 and 2005
Fugitive Emissions from Petroleum Systems	CH_4	28.5	✓	L,T	Level in 1990
Non-CO_2 Emissions from Stationary Combustion	CH_4	6.9			
Fugitive Emissions from Abandoned Coal Mines	CH_4	5.5			
Mobile Combustion: Road & Other	CH_4	2.4			
Mobile Combustion: Aviation	CH_4	0.1			
Mobile Combustion: Marine	CH_4	0.1			
Mobile Combustion: Road & Other	N_2O	35.7	✓	L,T	Level in 1990
Non-CO_2 Emissions from Stationary Combustion	N_2O	13.8			
Mobile Combustion: Aviation	N_2O	1.8			
Mobile Combustion: Marine	N_2O	0.5			
N_2O Emissions from Waste Combustion	N_2O	0.4			
International Bunker Fuels[a]	Several	98.2	✓	Q	
Industrial Processes					
CO_2 Emissions from Cement Manufacture	CO_2	45.9	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Iron and Steel Production	CO_2	45.2	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Ammonia Manufacture and Urea Application	CO_2	16.3	✓	T	
CO_2 Emissions from Lime Manufacture	CO_2	13.7			
CO_2 Emissions from Limestone and Dolomite Use	CO_2	7.4			
CO_2 Emissions from Aluminum Production	CO_2	4.2			
CO_2 Emissions from Soda Ash Manufacture and Consumption	CO_2	4.2			
CO_2 Emissions from Petrochemical Production	CO_2	2.9			
CO_2 Emissions from Titanium Dioxide Production	CO_2	1.9			
CO_2 Emissions from Phosphoric Acid Production	CO_2	1.4			
CO_2 Emissions from Ferroalloy Production	CO_2	1.4			
CO_2 Emissions from CO_2 Consumption	CO_2	1.3			
CO_2 Emissions from Zinc Production	CO_2	0.5			
CO_2 Emissions from Lead Production	CO_2	0.3			
CO_2 Emissions from Silicon Carbide Production and Consumption	CO_2	0.2			
CH_4 Emissions from Petrochemical Production	CH_4	1.1			
CH_4 Emissions from Iron and Steel Production	CH_4	1.0			
CH_4 Emissions from Silicon Carbide Production and Consumption	CH_4	+			
CH_4 Emissions from Ferroalloy Production	CH_4	+			
N_2O Emissions from Nitric Acid Production	N_2O	15.7			
N_2O Emissions from Adipic Acid Production	N_2O	6.0	✓	T	
N_2O Emissions from N_2O Product Usage	N_2O	4.3			
Emissions from Substitutes for Ozone Depleting Substances	HiGWP	123.3	✓	L,T	Level in 2005
HFC-23 Emissions from HCFC-22 Production	HiGWP	16.5	✓	L,T	Level in 1990
SF_6 Emissions from Electrical Transmission and Distribution	HiGWP	13.2	✓	T	
PFC, HFC, and SF_6 Emissions from Semiconductor Manufacture	HiGWP	4.3			
PFC Emissions from Aluminum Production	HiGWP	3.0	✓	T	
SF_6 Emissions from Magnesium Production and Processing	HiGWP	2.7			
Agriculture					
CH_4 Emissions from Enteric Fermentation in Domestic Livestock	CH_4	112.1	✓	L,T	Level in 1990 and 2005
CH_4 Emissions from Manure Management	CH_4	41.3	✓	L	Level in 1990 and 2005
CH_4 Emissions from Rice Cultivation	CH_4	6.9			
CH_4 Emissions from Field Burning of Agricultural Residues	CH_4	0.9			
Direct N_2O Emissions from Agricultural Soil Management	N_2O	310.5	✓	L,T	Level in 1990 and 2005

Indirect N_2O Emissions from Applied Nitrogen	N_2O	54.6	✓	L,T	Level in 1990 and 2005
N_2O Emissions from Manure Management	N_2O	9.5			
N_2O Emissions from Field Burning of Agricultural Residues	N_2O	0.5			
Waste					
CH_4 Emissions from Landfills	CH_4	132.0	✓	L,T	Level in 1990 and 2005
CH_4 Emissions from Wastewater Treatment	CH_4	25.4			
N_2O Emissions from Wastewater Treatment	N_2O	8.0			
Land Use, Land-Use Change, and Forestry					
CO_2 Emissions from Forest Land Remaining Forest Land	CO_2	(698.7)	✓	L	Level in 1990 and 2005
CO_2 Emissions from Settlements Remaining Settlements	CO_2	(88.5)	✓	L,T	Level in 1990 and 2005
CO_2 Emissions from Cropland Remaining Cropland	CO_2	(39.4)	✓	L,T	Level in 2005
CO_2 Emissions from Land Converted to Grassland	CO_2	(16.3)			
CO_2 Emissions from Grassland Remaining Grassland	CO_2	16.1	✓	T	
CO_2 Emissions from Landfilled Yard Trimmings and Food Scraps	CO_2	(8.8)	✓	T	
CO_2 Emissions from Land Converted to Cropland	CO_2	7.2			
CH_4 Emissions from Forest Land Remaining Forest Land	CH_4	11.6			
N_2O Emissions from Settlements Remaining Settlements	N_2O	5.8			
N_2O Emissions from Forest Land Remaining Forest Land	N_2O	1.5			

[a] Emissions from these sources not included in totals.
+ Does not exceed 0.05 Tg CO_2 Eq.
Note: The Tier 1 approach for identifying key categories does not directly include assessment of uncertainty in emission estimates.

Evaluation of Tier 1 Key Categories

Level Assessment

When using a Tier 1 approach for the level assessment, a predetermined cumulative emissions threshold is used to identify key categories. When source and sink categories are sorted in order of decreasing absolute emissions, those that fall at the top of the list and cumulatively account for 95 percent of emissions are considered key categories. The 95 percent threshold in the IPCC *Good Practice Guidance* (IPCC 2000) was designed to establish a general level where the key category analysis covers approximately 75 to 92 percent of inventory uncertainty.

It is important to note that a key category analysis can be sensitive to the definitions of the source and sink categories. If a large source category is split into many subcategories, then the subcategories may have contributions to the total inventory that are too small for those source categories to be considered key. Similarly, a collection of small, non-key source categories adding up to less than 5 percent of total emissions could become key source categories if those source categories were aggregated into a single source category. The United States has attempted to define source and sink categories by the conventions which would allow comparison with other international key categories, while still maintaining the category definitions that constitute how the emissions estimates were calculated for this report. As such, some of the category names used in the key category analysis may differ from the names used in the main body of the report. Additionally, the United States accounts for some source categories, including fossil fuel feedstocks, international bunkers, and emissions from U.S. territories, that are derived from unique data sources using country-specific methodologies.

Trend Assessment

The United States is currently taking a Tier 1 approach to identify trend assessment key categories until a full and consistent inventory-wide uncertainty analysis is completed. The Tier 1 approach for trend assessment is defined as the product of the source or sink category level assessment and the absolute difference between the source or sink category trend and the total trend. In turn, the source or sink category trend is defined as the change in emissions from the base year to the current year, as a percentage of current year emissions from that source or sink category. The total trend is the percentage change in total inventory emissions from the base year to the current year.

Thus, the source or sink category trend assessment will be large if the source or sink category represents a large percentage of emissions and/or has a trend that is quite different from the overall inventory trend. To determine key categories, the trend assessments are sorted in decreasing order, so that the source or sink categories with the highest trend assessments appear first. The trend assessments are summed until the threshold of 95 percent is reached; all categories that fall within that cumulative 95 percent are considered key categories.

Tier 2 Key Category Assessment

IPCC *Good Practice Guidance* (IPCC 2000) recommends using a Tier 2 method for identifying key source categories if nationally derived source-level uncertainties are measured. The Tier 2 approach is a more detailed analysis that builds on the Tier 1 approach by multiplying the results of the Tier 1 analysis by the relative uncertainty of each source category. This method is likely to reduce the number of key source categories under consideration. As part of its multi-year uncertainty assessment effort, the United States has already developed quantitative uncertainty estimates for most source and sink categories. When quantitative estimates of uncertainty become available for all source categories, future inventories can incorporate this Tier 2 approach.

Table A- 4: 1990 Key Source Category Tier 1 Analysis—Level Assessment, without LULUCF

IPCC Source Categories	Direct GHG	1990 Estimate ($Tg CO_2 Eq.$)	1990 Estimate ($Tg CO_2 Eq.$)	Level Assessment	Cumulative Total of Level Assessment
CO_2 Emissions from Stationary Combustion - Coal	CO_2	1699.0	1699.0	0.27	0.27
Mobile Combustion: Road & Other	CO_2	1237.2	1237.2	0.20	0.47
CO_2 Emissions from Stationary Combustion - Gas	CO_2	975.4	975.4	0.16	0.63
CO_2 Emissions from Stationary Combustion - Oil	CO_2	585.4	585.4	0.09	0.72
Direct N_2O Emissions from Agricultural Soil Management	N_2O	310.1	310.1	0.05	0.77
Mobile Combustion: Aviation	CO_2	180.0	180.0	0.03	0.80
CH_4 Emissions from Landfills	CH_4	161.0	161.0	0.03	0.83
Fugitive Emissions from Natural Gas Systems	CH_4	124.5	124.5	0.02	0.85
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	117.3	117.3	0.02	0.87
CH_4 Emissions from Enteric Fermentation	CH_4	115.7	115.7	0.02	0.88
CO_2 Emissions from Iron and Steel Production	CO_2	84.9	84.9	0.01	0.90
Fugitive Emissions from Coal Mining	CH_4	81.9	81.9	0.01	0.91
Indirect N_2O Emissions from Applied Nitrogen	N_2O	56.8	56.8	0.01	0.92
Mobile Combustion: Marine	CO_2	46.8	46.8	0.01	0.93
Mobile Combustion: Road & Other	N_2O	41.6	41.6	0.01	0.93
HFC-23 Emissions from HCFC-22 Production	HFCs	35.0	35.0	0.01	0.94
Fugitive Emissions from Petroleum Systems	CH_4	34.4	34.4	0.01	0.95
CO_2 Emissions from Natural Gas Systems	CO_2	33.7	33.7	0.01	0.95
CO_2 Emissions from Cement Manufacture	CO_2	33.3	33.3	0.01	0.96
CH_4 Emissions from Manure Management	CH_4	30.9	30.9	<0.01	0.96
SF_6 Emissions from Electrical Transmission and Distribution	SF_6	27.1	27.1	<0.01	0.97
CH_4 Emissions from Wastewater Treatment	CH_4	24.8	24.8	<0.01	0.97
CO_2 Emissions from Ammonia Production and Urea Application	CO_2	19.3	19.3	<0.01	0.97
PFC Emissions from Aluminum Production	PFCs	18.5	18.5	<0.01	0.98
N_2O Emissions from Nitric Acid Production	N_2O	17.8	17.8	<0.01	0.98
N_2O Emissions from Adipic Acid Production	N_2O	15.2	15.2	<0.01	0.98
Non-CO_2 Emissions from Stationary Combustion	N_2O	12.3	12.3	<0.01	0.98
CO_2 Emissions from Lime Manufacture	CO_2	11.3	11.3	<0.01	0.98
CO_2 Emissions from Waste Combustion	CO_2	10.9	10.9	<0.01	0.99
N_2O Emissions from Manure Management	N_2O	8.6	8.6	<0.01	0.99
Non-CO_2 Emissions from Stationary Combustion	CH_4	8.0	8.0	<0.01	0.99
CH_4 Emissions from Rice Cultivation	CH_4	7.1	7.1	<0.01	0.99
CO_2 Emissions from Aluminum Production	CO_2	6.8	6.8	<0.01	0.99
N_2O Emissions from Wastewater	N_2O	6.4	6.4	<0.01	0.99
Fugitive Emissions from Abandoned Coal Mines	CH_4	6.0	6.0	<0.01	0.99
CO_2 Emissions from Limestone and Dolomite Use	CO_2	5.5	5.5	<0.01	0.99
SF_6 Emissions from Magnesium Production and Processing	SF_6	5.4	5.4	<0.01	0.99
Mobile Combustion: Road & Other	CH_4	4.5	4.5	<0.01	1.00
N_2O Emissions from N_2O Product Usage	N_2O	4.3	4.3	<0.01	1.00
CO_2 Emissions from Soda Ash Manufacture and Consumption	CO_2	4.1	4.1	<0.01	1.00

PFC, HFC, and SF_6 Emissions from Semiconductor Manufacture	SF_6	2.9	2.9	<0.01	1.00
CO_2 Emissions from Petrochemical Production	CO_2	2.2	2.2	<0.01	1.00
CO_2 Emissions from Ferroalloy Production	CO_2	2.2	2.2	<0.01	1.00
Mobile Combustion: Aviation	N_2O	1.7	1.7	<0.01	1.00
CO_2 Emissions from Phosphoric Acid Production	CO_2	1.5	1.5	<0.01	1.00
CO_2 Emissions from Carbon Dioxide Consumption	CO_2	1.4	1.4	<0.01	1.00
CH_4 Emissions from Iron and Steel Production	CH_4	1.3	1.3	<0.01	1.00
CO_2 Emissions from Titanium Dioxide Production	CO_2	1.3	1.3	<0.01	1.00
CO_2 Emissions from Zinc Production	CO_2	0.9	0.9	<0.01	1.00
CH_4 Emissions from Petrochemical Production	CH_4	0.9	0.9	<0.01	1.00
CH_4 Emissions from Field Burning of Agricultural Residues	CH_4	0.7	0.7	<0.01	1.00
N_2O Emissions from Waste Combustion	N_2O	0.5	0.5	<0.01	1.00
CO_2 Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	0.4	<0.01	1.00
Mobile Combustion: Marine	N_2O	0.4	0.4	<0.01	1.00
CO_2 Emissions from Silicon Carbide Production and Consumption	CO_2	0.4	0.4	<0.01	1.00
N_2O Emissions from Field Burning of Agricultural Residues	N_2O	0.4	0.4	<0.01	1.00
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	0.3	<0.01	1.00
CO_2 Emissions from Lead Production	CO_2	0.3	0.3	<0.01	1.00
Mobile Combustion: Aviation	CH_4	0.2	0.2	<0.01	1.00
Mobile Combustion: Marine	CH_4	0.1	0.1	<0.01	1.00
CH_4 Emissions from Silicon Carbide Production and Consumption	CH_4	+	+	<0.01	1.00
CH_4 Emissions from Ferroalloy Production	CH_4	+	+	<0.01	1.00
TOTAL		**6229.0**	**6229.0**	**1.00**	

Note: LULUCF sources and sinks are not included in this analysis.

Table A- 5: 1990 Key Source Category Tier 1 Analysis—Level Assessment, with LULUCF

IPCC Source Categories	Direct GHG	1990 Estimate ($Tg\ CO_2$ Eq.)	1990 Estimate ($Tg\ CO_2$ Eq.)	Level Assessment	Cumulative Total of Level Assessment
CO_2 Emissions from Stationary Combustion - Coal	CO_2	1699.0	1699.0	0.24	0.24
Mobile Combustion: Road & Other	CO_2	1237.2	1237.2	0.18	0.42
CO_2 Emissions from Stationary Combustion - Gas	CO_2	975.4	975.4	0.14	0.56
CO_2 Emissions from Forest Land Remaining Forest Land	CO_2	598.5	598.5	0.09	0.65
CO_2 Emissions from Stationary Combustion - Oil	CO_2	585.4	585.4	0.08	0.73
Direct N_2O Emissions from Agricultural Soil Management	N_2O	310.1	310.1	0.04	0.78
Mobile Combustion: Aviation	CO_2	180.0	180.0	0.03	0.80
CH_4 Emissions from Landfills	CH_4	161.0	161.0	0.02	0.82
Fugitive Emissions from Natural Gas Systems	CH_4	124.5	124.5	0.02	0.84
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	117.3	117.3	0.02	0.86
CH_4 Emissions from Enteric Fermentation	CH_4	115.7	115.7	0.02	0.88
CO_2 Emissions from Iron and Steel Production	CO_2	84.9	84.9	0.01	0.89
Fugitive Emissions from Coal Mining	CH_4	81.9	81.9	0.01	0.90
CO_2 Emissions from Settlements Remaining Settlements	CO_2	57.5	57.5	0.01	0.91
Indirect N_2O Emissions from Applied Nitrogen	N_2O	56.8	56.8	0.01	0.92
Mobile Combustion: Marine	CO_2	46.8	46.8	0.01	0.92
Mobile Combustion: Road & Other	N_2O	41.6	41.6	0.01	0.93
HFC-23 Emissions from HCFC-22 Production	HFCs	35.0	35.0	0.01	0.93
Fugitive Emissions from Petroleum Systems	CH_4	34.4	34.4	<0.01	0.94
CO_2 Emissions from Natural Gas Systems	CO_2	33.7	33.7	<0.01	0.94
CO_2 Emissions from Cement Manufacture	CO_2	33.3	33.3	<0.01	0.95
CH_4 Emissions from Manure Management	CH_4	30.9	30.9	<0.01	0.95
CO_2 Emissions from Cropland Remaining Cropland	CO_2	28.1	28.1	<0.01	0.96
SF_6 Emissions from Electrical Transmission and Distribution	SF_6	27.1	27.1	<0.01	0.96
CH_4 Emissions from Wastewater Treatment	CH_4	24.8	24.8	<0.01	0.96
CO2 Emissions from Landfilled Yard Trimmings and Food Scraps	CO_2	22.8	22.8	<0.01	0.97
CO_2 Emissions from Ammonia Production and Urea Application	CO_2	19.3	19.3	<0.01	0.97
PFC Emissions from Aluminum Production	PFCs	18.5	18.5	<0.01	0.97
N_2O Emissions from Nitric Acid Production	N_2O	17.8	17.8	<0.01	0.98

N_2O Emissions from Adipic Acid Production	N_2O	15.2	15.2	<0.01	0.98
CO_2 Emissions from Land Converted to Grassland	CO_2	14.6	14.6	<0.01	0.98
Non-CO_2 Emissions from Stationary Combustion	N_2O	12.3	12.3	<0.01	0.98
CO_2 Emissions from Lime Manufacture	CO_2	11.3	11.3	<0.01	0.98
CO_2 Emissions from Waste Combustion	CO_2	10.9	10.9	<0.01	0.98
CO_2 Emissions from Land Converted to Cropland	CO_2	8.7	8.7	<0.01	0.99
N_2O Emissions from Manure Management	N_2O	8.6	8.6	<0.01	0.99
Non-CO_2 Emissions from Stationary Combustion	CH_4	8.0	8.0	<0.01	0.99
CH_4 Emissions from Rice Cultivation	CH_4	7.1	7.1	<0.01	0.99
CH_4 Emissions from Forest Land Remaining Forest Land	CH_4	7.1	7.1	<0.01	0.99
CO_2 Emissions from Aluminum Production	CO_2	6.8	6.8	<0.01	0.99
N_2O Emissions from Wastewater	N_2O	6.4	6.4	<0.01	0.99
Fugitive Emissions from Abandoned Coal Mines	CH_4	6.0	6.0	<0.01	0.99
CO_2 Emissions from Limestone and Dolomite Use	CO_2	5.5	5.5	<0.01	0.99
SF_6 Emissions from Magnesium Production and Processing	SF_6	5.4	5.4	<0.01	0.99
N_2O Emissions from Settlements Remaining Settlements	N_2O	5.1	5.1	<0.01	1.00
Mobile Combustion: Road & Other	CH_4	4.5	4.5	<0.01	1.00
N_2O Emissions from N_2O Product Usage	N_2O	4.3	4.3	<0.01	1.00
CO_2 Emissions from Soda Ash Manufacture and Consumption	CO_2	4.1	4.1	<0.01	1.00
PFC, HFC, and SF_6 Emissions from Semiconductor Manufacture	SF_6	2.9	2.9	<0.01	1.00
CO_2 Emissions from Petrochemical Production	CO_2	2.2	2.2	<0.01	1.00
CO_2 Emissions from Ferroalloy Production	CO_2	2.2	2.2	<0.01	1.00
Mobile Combustion: Aviation	N_2O	1.7	1.7	<0.01	1.00
CO_2 Emissions from Phosphoric Acid Production	CO_2	1.5	1.5	<0.01	1.00
CO_2 Emissions from Carbon Dioxide Consumption	CO_2	1.4	1.4	<0.01	1.00
CH_4 Emissions from Iron and Steel Production	CH_4	1.3	1.3	<0.01	1.00
CO_2 Emissions from Titanium Dioxide Production	CO_2	1.3	1.3	<0.01	1.00
CO_2 Emissions from Zinc Production	CO_2	0.9	0.9	<0.01	1.00
CH_4 Emissions from Petrochemical Production	CH_4	0.9	0.9	<0.01	1.00
N_2O Emissions from Forest Land Remaining Forest Land	N_2O	0.8	0.8	<0.01	1.00
CH_4 Emissions from Field Burning of Agricultural Residues	CH_4	0.7	0.7	<0.01	1.00
N_2O Emissions from Waste Combustion	N_2O	0.5	0.5	<0.01	1.00
CO_2 Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	0.4	<0.01	1.00
Mobile Combustion: Marine	N_2O	0.4	0.4	<0.01	1.00
CO_2 Emissions from Silicon Carbide Production and Consumption	CO_2	0.4	0.4	<0.01	1.00
N_2O Emissions from Field Burning of Agricultural Residues	N_2O	0.4	0.4	<0.01	1.00
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	0.3	<0.01	1.00
CO_2 Emissions from Lead Production	CO_2	0.3	0.3	<0.01	1.00
Mobile Combustion: Aviation	CH_4	0.2	0.2	<0.01	1.00
CO_2 Emissions from Grassland Remaining Grassland	CO_2	0.1	0.1	<0.01	1.00
Mobile Combustion: Marine	CH_4	0.1	0.1	<0.01	1.00
CH_4 Emissions from Silicon Carbide Production and Consumption	CH_4	+	+	<0.01	1.00
CH_4 Emissions from Ferroalloy Production	CH_4	+	+	<0.01	1.00
TOTAL		**6972.4**	**6972.4**	**1.00**	

Table A- 6: 2005 Key Source Category Tier 1 Analysis—Level Assessment, without LULUCF

IPCC Source Categories	Direct GHG	1990 Estimate ($Tg CO_2 Eq.$)	2005 Estimate ($Tg CO_2 Eq.$)	Level Assessment	Cumulative Total of Level Assessment
CO_2 Emissions from Stationary Combustion - Coal	CO_2	1699.0	2093.6	0.29	0.29
Mobile Combustion: Road & Other	CO_2	1237.2	1642.9	0.23	0.52
CO_2 Emissions from Stationary Combustion - Gas	CO_2	975.4	1138.2	0.16	0.67
CO_2 Emissions from Stationary Combustion - Oil	CO_2	585.4	626.3	0.09	0.76
Direct N_2O Emissions from Agricultural Soil Management	N_2O	310.1	310.5	0.04	0.80
Mobile Combustion: Aviation	CO_2	180.0	186.1	0.03	0.83
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	117.3	142.4	0.02	0.85
CH_4 Emissions from Landfills	CH_4	161.0	132.0	0.02	0.87
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	123.3	0.02	0.88

CH_4 Emissions from Enteric Fermentation	CH_4	115.7	112.1	0.02	0.90
Fugitive Emissions from Natural Gas Systems	CH_4	124.5	111.1	0.02	0.91
Mobile Combustion: Marine	CO_2	46.8	63.7	0.01	0.92
Indirect N_2O Emissions from Applied Nitrogen	N_2O	56.8	54.6	0.01	0.93
Fugitive Emissions from Coal Mining	CH_4	81.9	52.4	0.01	0.94
CO_2 Emissions from Cement Manufacture	CO_2	33.3	45.9	0.01	0.94
CO_2 Emissions from Iron and Steel Production	CO_2	84.9	45.2	0.01	0.95
CH_4 Emissions from Manure Management	CH_4	30.9	41.3	0.01	0.96
Mobile Combustion: Road & Other	N_2O	41.6	35.7	<0.01	0.96
Fugitive Emissions from Petroleum Systems	CH_4	34.4	28.5	<0.01	0.96
CO_2 Emissions from Natural Gas Systems	CO_2	33.7	28.2	<0.01	0.97
CH_4 Emissions from Wastewater Treatment	CH_4	24.8	25.4	<0.01	0.97
CO_2 Emissions from Waste Combustion	CO_2	10.9	20.9	<0.01	0.97
HFC-23 Emissions from HCFC-22 Production	HFCs	35.0	16.5	<0.01	0.98
CO_2 Emissions from Ammonia Production and Urea Application	CO_2	19.3	16.3	<0.01	0.98
N_2O Emissions from Nitric Acid Production	N_2O	17.8	15.7	<0.01	0.98
Non-CO_2 Emissions from Stationary Combustion	N_2O	12.3	13.8	<0.01	0.98
CO_2 Emissions from Lime Manufacture	CO_2	11.3	13.7	<0.01	0.99
SF_6 Emissions from Electrical Transmission and Distribution	SF_6	27.1	13.2	<0.01	0.99
N_2O Emissions from Manure Management	N_2O	8.6	9.5	<0.01	0.99
N_2O Emissions from Wastewater	N_2O	6.4	8.0	<0.01	0.99
CO_2 Emissions from Limestone and Dolomite Use	CO_2	5.5	7.4	<0.01	0.99
Non-CO_2 Emissions from Stationary Combustion	CH_4	8.0	6.9	<0.01	0.99
CH_4 Emissions from Rice Cultivation	CH_4	7.1	6.9	<0.01	0.99
N_2O Emissions from Adipic Acid Production	N_2O	15.2	6.0	<0.01	0.99
Fugitive Emissions from Abandoned Coal Mines	CH_4	6.0	5.5	<0.01	0.99
PFC, HFC, and SF_6 Emissions from Semiconductor Manufacture	SF_6	2.9	4.3	<0.01	0.99
N_2O Emissions from N_2O Product Usage	N_2O	4.3	4.3	<0.01	1.00
CO_2 Emissions from Soda Ash Manufacture and Consumption	CO_2	4.1	4.2	<0.01	1.00
CO_2 Emissions from Aluminum Production	CO_2	6.8	4.2	<0.01	1.00
PFC Emissions from Aluminum Production	PFCs	18.5	3.0	<0.01	1.00
CO_2 Emissions from Petrochemical Production	CO_2	2.2	2.9	<0.01	1.00
SF_6 Emissions from Magnesium Production and Processing	SF_6	5.4	2.7	<0.01	1.00
Mobile Combustion: Road & Other	CH_4	4.5	2.4	<0.01	1.00
CO_2 Emissions from Titanium Dioxide Production	CO_2	1.3	1.9	<0.01	1.00
Mobile Combustion: Aviation	N_2O	1.7	1.8	<0.01	1.00
CO_2 Emissions from Ferroalloy Production	CO_2	2.2	1.4	<0.01	1.00
CO_2 Emissions from Phosphoric Acid Production	CO_2	1.5	1.4	<0.01	1.00
CO_2 Emissions from Carbon Dioxide Consumption	CO_2	1.4	1.3	<0.01	1.00
CH_4 Emissions from Petrochemical Production	CH_4	0.9	1.1	<0.01	1.00
CH_4 Emissions from Iron and Steel Production	CH_4	1.3	1.0	<0.01	1.00
CH_4 Emissions from Field Burning of Agricultural Residues	CH_4	0.7	0.9	<0.01	1.00
N_2O Emissions from Field Burning of Agricultural Residues	N_2O	0.4	0.5	<0.01	1.00
Mobile Combustion: Marine	N_2O	0.4	0.5	<0.01	1.00
CO_2 Emissions from Zinc Production	CO_2	0.9	0.5	<0.01	1.00
N_2O Emissions from Waste Combustion	N_2O	0.5	0.4	<0.01	1.00
CO_2 Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	0.4	<0.01	1.00
CO_2 Emissions from Lead Production	CO_2	0.3	0.3	<0.01	1.00
CO_2 Emissions from Silicon Carbide Production and Consumption	CO_2	0.4	0.2	<0.01	1.00
Mobile Combustion: Aviation	CH_4	0.2	0.1	<0.01	1.00
Mobile Combustion: Marine	CH_4	0.1	0.1	<0.01	1.00
CH_4 Emissions from Silicon Carbide Production and Consumption	CH_4	+	+	<0.01	1.00
CH_4 Emissions from Ferroalloy Production	CH_4	+	+	<0.01	1.00
TOTAL		**6229.0**	**7241.5**	**1.00**	

Note: LULUCF sources and sinks are not included in this analysis.

Table A-7: 2005 Key Source Category Tier 1 Analysis—Level Assessment with LULUCF

IPCC Source Categories	Direct GHG	1990 Estimate	2005 Estimate	Level	Cumulative

		(Tg CO_2 Eq.)	(Tg CO_2 Eq.)	Assessment	Total of Level Assessment
CO_2 Emissions from Stationary Combustion - Coal	CO_2	1699.0	2093.6	0.26	0.26
Mobile Combustion: Road & Other	CO_2	1237.2	1642.9	0.20	0.46
CO_2 Emissions from Stationary Combustion - Gas	CO_2	975.4	1138.2	0.14	0.60
CO_2 Emissions from Forest Land Remaining Forest Land	CO_2	598.5	698.7	0.09	0.69
CO_2 Emissions from Stationary Combustion - Oil	CO_2	585.4	626.3	0.08	0.76
Direct N_2O Emissions from Agricultural Soil Management	N_2O	310.1	310.5	0.04	0.80
Mobile Combustion: Aviation	CO_2	180.0	186.1	0.02	0.82
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	117.3	142.4	0.02	0.84
CH_4 Emissions from Landfills	CH_4	161.0	132.0	0.02	0.86
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	123.3	0.02	0.87
CH_4 Emissions from Enteric Fermentation	CH_4	115.7	112.1	0.01	0.89
Fugitive Emissions from Natural Gas Systems	CH_4	124.5	111.1	0.01	0.90
CO_2 Emissions from Settlements Remaining Settlements	CO_2	57.5	88.5	0.01	0.91
Mobile Combustion: Marine	CO_2	46.8	63.7	0.01	0.92
Indirect N_2O Emissions from Applied Nitrogen	N_2O	56.8	54.6	0.01	0.92
Fugitive Emissions from Coal Mining	CH_4	81.9	52.4	0.01	0.93
CO_2 Emissions from Cement Manufacture	CO_2	33.3	45.9	0.01	0.94
CO_2 Emissions from Iron and Steel Production	CO_2	84.9	45.2	0.01	0.94
CH_4 Emissions from Manure Management	CH_4	30.9	41.3	0.01	0.95
CO_2 Emissions from Cropland Remaining Cropland	CO_2	28.1	39.4	<0.01	0.95
Mobile Combustion: Road & Other	N_2O	41.6	35.7	<0.01	0.96
Fugitive Emissions from Petroleum Systems	CH_4	34.4	28.5	<0.01	0.96
CO_2 Emissions from Natural Gas Systems	CO_2	33.7	28.2	<0.01	0.96
CH_4 Emissions from Wastewater Treatment	CH_4	24.8	25.4	<0.01	0.97
CO_2 Emissions from Waste Combustion	CO_2	10.9	20.9	<0.01	0.97
HFC-23 Emissions from HCFC-22 Production	HFCs	35.0	16.5	<0.01	0.97
CO_2 Emissions from Land Converted to Grassland	CO_2	14.6	16.3	<0.01	0.97
CO_2 Emissions from Ammonia Production and Urea Application	CO_2	19.3	16.3	<0.01	0.98
CO_2 Emissions from Grassland Remaining Grassland	CO_2	0.1	16.1	<0.01	0.98
N_2O Emissions from Nitric Acid Production	N_2O	17.8	15.7	<0.01	0.98
Non-CO_2 Emissions from Stationary Combustion	N_2O	12.3	13.8	<0.01	0.98
CO_2 Emissions from Lime Manufacture	CO_2	11.3	13.7	<0.01	0.98
SF_6 Emissions from Electrical Transmission and Distribution	SF_6	27.1	13.2	<0.01	0.98
CH_4 Emissions from Forest Land Remaining Forest Land	CH_4	7.1	11.6	<0.01	0.99
N_2O Emissions from Manure Management	N_2O	8.6	9.5	<0.01	0.99
CO2 Emissions from Landfilled Yard Trimmings and Food Scraps	CO_2	22.8	8.8	<0.01	0.99
N_2O Emissions from Wastewater	N_2O	6.4	8.0	<0.01	0.99
CO_2 Emissions from Limestone and Dolomite Use	CO_2	5.5	7.4	<0.01	0.99
CO_2 Emissions from Land Converted to Cropland	CO_2	8.7	7.2	<0.01	0.99
Non-CO_2 Emissions from Stationary Combustion	CH_4	8.0	6.9	<0.01	0.99
CH_4 Emissions from Rice Cultivation	CH_4	7.1	6.9	<0.01	0.99
N_2O Emissions from Adipic Acid Production	N_2O	15.2	6.0	<0.01	0.99
N_2O Emissions from Settlements Remaining Settlements	N_2O	5.1	5.8	<0.01	0.99
Fugitive Emissions from Abandoned Coal Mines	CH_4	6.0	5.5	<0.01	0.99
PFC, HFC, and SF_6 Emissions from Semiconductor Manufacture	SF_6	2.9	4.3	<0.01	1.00
N_2O Emissions from N_2O Product Usage	N_2O	4.3	4.3	<0.01	1.00
CO_2 Emissions from Soda Ash Manufacture and Consumption	CO_2	4.1	4.2	<0.01	1.00
CO_2 Emissions from Aluminum Production	CO_2	6.8	4.2	<0.01	1.00
PFC Emissions from Aluminum Production	PFCs	18.5	3.0	<0.01	1.00
CO_2 Emissions from Petrochemical Production	CO_2	2.2	2.9	<0.01	1.00
SF_6 Emissions from Magnesium Production and Processing	SF_6	5.4	2.7	<0.01	1.00
Mobile Combustion: Road & Other	CH_4	4.5	2.4	<0.01	1.00
CO_2 Emissions from Titanium Dioxide Production	CO_2	1.3	1.9	<0.01	1.00
Mobile Combustion: Aviation	N_2O	1.7	1.8	<0.01	1.00
N_2O Emissions from Forest Land Remaining Forest Land	N_2O	0.8	1.5	<0.01	1.00
CO_2 Emissions from Ferroalloy Production	CO_2	2.2	1.4	<0.01	1.00

CO_2 Emissions from Phosphoric Acid Production	CO_2	1.5	1.4	<0.01	1.00
CO_2 Emissions from Carbon Dioxide Consumption	CO_2	1.4	1.3	<0.01	1.00
CH_4 Emissions from Petrochemical Production	CH_4	0.9	1.1	<0.01	1.00
CH_4 Emissions from Iron and Steel Production	CH_4	1.3	1.0	<0.01	1.00
CH_4 Emissions from Field Burning of Agricultural Residues	CH_4	0.7	0.9	<0.01	1.00
N_2O Emissions from Field Burning of Agricultural Residues	N_2O	0.4	0.5	<0.01	1.00
Mobile Combustion: Marine	N_2O	0.4	0.5	<0.01	1.00
CO_2 Emissions from Zinc Production	CO_2	0.9	0.5	<0.01	1.00
N_2O Emissions from Waste Combustion	N_2O	0.5	0.4	<0.01	1.00
CO_2 Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	0.4	<0.01	1.00
CO_2 Emissions from Lead Production	CO_2	0.3	0.3	<0.01	1.00
CO_2 Emissions from Silicon Carbide Production and Consumption	CO_2	0.4	0.2	<0.01	1.00
Mobile Combustion: Aviation	CH_4	0.2	0.1	<0.01	1.00
Mobile Combustion: Marine	CH_4	0.1	0.1	<0.01	1.00
CH_4 Emissions from Silicon Carbide Production and Consumption	CH_4	+	+	<0.01	1.00
CH_4 Emissions from Ferroalloy Production	CH_4	+	+	<0.01	1.00
TOTAL		**6972.4**	**8135.5**	**1.00**	

Table A-8: 1990-2005 Key Source Category Tier 1 Analysis—Trend Assessment, without LULUCF

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO_2 Eq.)	2005 Estimate (Tg CO_2 Eq.)	Trend Assessment	Percent Contribution to Trend (%)	Cumulative Contribution to Trend (%)
Mobile Combustion: Road & Other	CO_2	1237.2	1642.9	0.02	20.9	21
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	123.3	0.01	12.5	33
CO_2 Emissions from Stationary Combustion - Coal	CO_2	1699.0	2093.6	0.01	12.1	45
CH_4 Emissions from Landfills	CH_4	161.0	132.0	0.01	5.6	51
CO_2 Emissions from Stationary Combustion - Oil	CO_2	585.4	626.3	0.01	5.5	57
CO_2 Emissions from Iron and Steel Production	CO_2	84.9	45.2	0.01	5.5	62
Direct N_2O Emissions from Agricultural Soil Management	N_2O	310.1	310.5	0.01	5.1	67
Fugitive Emissions from Coal Mining	CH_4	81.9	52.4	0.01	4.4	72
Fugitive Emissions from Natural Gas Systems	CH_4	124.5	111.1	<0.01	3.4	75
HFC-23 Emissions from HCFC-22 Production	HFCs	35.0	16.5	<0.01	2.5	77
Mobile Combustion: Aviation	CO_2	180.0	186.1	<0.01	2.4	80
CH_4 Emissions from Enteric Fermentation	CH_4	115.7	112.1	<0.01	2.3	82
PFC Emissions from Aluminum Production	PFCs	18.5	3.0	<0.01	1.9	84
SF_6 Emissions from Electrical Transmission and Distribution	SF_6	27.1	13.2	<0.01	1.9	86
Mobile Combustion: Road & Other	N_2O	41.6	35.7	<0.01	1.3	87
N_2O Emissions from Adipic Acid Production	N_2O	15.2	6.0	<0.01	1.2	88
Fugitive Emissions from Petroleum Systems	CH_4	34.4	28.5	<0.01	1.2	89
Indirect N_2O Emissions from Applied Nitrogen	N_2O	56.8	54.6	<0.01	1.2	91
CO_2 Emissions from Natural Gas Systems	CO_2	33.7	28.2	<0.01	1.1	92
Mobile Combustion: Marine	CO_2	46.8	63.7	<0.01	1.0	93
CO_2 Emissions from Waste Combustion	CO_2	10.9	20.9	<0.01	0.8	94
CO_2 Emissions from Cement Manufacture	CO_2	33.3	45.9	<0.01	0.7	94
CO_2 Emissions from Ammonia Production and Urea Application	CO_2	19.3	16.3	<0.01	0.6	95
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	117.3	142.4	<0.01	0.6	96
CH_4 Emissions from Manure Management	CH_4	30.9	41.3	<0.01	0.5	96
N_2O Emissions from Nitric Acid Production	N_2O	17.8	15.7	<0.01	0.5	97
CO_2 Emissions from Stationary Combustion - Gas	CO_2	975.4	1138.2	<0.01	0.4	97
CO_2 Emissions from Aluminum Production	CO_2	6.8	4.2	<0.01	0.4	97
SF_6 Emissions from Magnesium Production and Processing	SF_6	5.4	2.7	<0.01	0.4	98
CH_4 Emissions from Wastewater Treatment	CH_4	24.8	25.4	<0.01	0.3	98
Mobile Combustion: Road & Other	CH_4	4.5	2.4	<0.01	0.3	98

Non- CO_2 Emissions from Stationary Combustion	CH_4	8.0	6.9	<0.01	0.2	99
Fugitive Emissions from Abandoned Coal Mines	CH_4	6.0	5.5	<0.01	0.1	99
CH_4 Emissions from Rice Cultivation	CH_4	7.1	6.9	<0.01	0.1	99
CO_2 Emissions from Ferroalloy Production	CO_2	2.2	1.4	<0.01	0.1	99
CO_2 Emissions from Limestone and Dolomite Use	CO_2	5.5	7.4	<0.01	0.1	99
PFC, HFC, and SF_6 Emissions from Semiconductor Manufacture	SF_6	2.9	4.3	<0.01	0.1	99
N_2O Emissions from N_2O Product Usage	N_2O	4.3	4.3	<0.01	0.1	99
CO_2 Emissions from Zinc Production	CO_2	0.9	0.5	<0.01	0.1	99
N_2O Emissions from Wastewater	N_2O	6.4	8.0	<0.01	0.1	99
CO_2 Emissions from Soda Ash Manufacture and Consumption	CO_2	4.1	4.2	<0.01	0.1	100
CH_4 Emissions from Iron and Steel Production	CH_4	1.3	1.0	<0.01	0.1	100
CO_2 Emissions from Lime Manufacture	CO_2	11.3	13.7	<0.01	0.1	100
N_2O Emissions from Manure Management	N_2O	8.6	9.5	<0.01	0.1	100
Non- CO_2 Emissions from Stationary Combustion	N_2O	12.3	13.8	<0.01	0.1	100
CO_2 Emissions from Titanium Dioxide Production	CO_2	1.3	1.9	<0.01	0.0	100
CO_2 Emissions from Phosphoric Acid Production	CO_2	1.5	1.4	<0.01	0.0	100
CO_2 Emissions from Carbon Dioxide Consumption	CO_2	1.4	1.3	<0.01	0.0	100
CO_2 Emissions from Petrochemical Production	CO_2	2.2	2.9	<0.01	0.0	100
CO_2 Emissions from Silicon Carbide Production and Consumption	CO_2	0.4	0.2	<0.01	0.0	100
Mobile Combustion: Aviation	N_2O	1.7	1.8	<0.01	0.0	100
N_2O Emissions from Waste Combustion	N_2O	0.5	0.4	<0.01	0.0	100
CO_2 Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	0.4	<0.01	0.0	100
CH_4 Emissions from Petrochemical Production	CH_4	0.9	1.1	<0.01	0.0	100
N_2O Emissions from Field Burning of Agricultural Residues	N_2O	0.4	0.5	<0.01	0.0	100
Mobile Combustion: Marine	N_2O	0.4	0.5	<0.01	0.0	100
CO_2 Emissions from Lead Production	CO_2	0.3	0.3	<0.01	0.0	100
CH_4 Emissions from Field Burning of Agricultural Residues	CH_4	0.7	0.9	<0.01	0.0	100
Mobile Combustion: Aviation	CH_4	0.2	0.1	<0.01	0.0	100
CH_4 Emissions from Silicon Carbide Production and Consumption	CH_4	+	+	<0.01	0.0	100
Mobile Combustion: Marine	CH_4	0.1	0.1	<0.01	0.0	100
CH_4 Emissions from Ferroalloy Production	CH_4	+	+	<0.01	0.0	100
TOTAL		**6229.0**	**7241.5**	**0.12**		

Note: LULUCF sources and sinks are not included in this analysis.

Table A-9: 1990-2005 Key Source Category Tier 1 Analysis—Trend Assessment, with LULUCF

IPCC Source Categories	Direct GHG	1990 Estimate ($Tg\ CO_2$ Eq.)	2005 Estimate ($Tg\ CO_2$ Eq.)	Trend Assessment	Percent Contribution to Trend (%)	Cumulative Contribution to Trend (%)
Mobile Combustion: Road & Other	CO_2	1237.2	1642.9	0.02	19.1	19
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	123.3	0.01	11.8	31
CO_2 Emissions from Stationary Combustion - Coal	CO_2	1699.0	2093.6	0.01	10.7	42
CO_2 Emissions from Stationary Combustion - Oil	CO_2	585.4	626.3	0.01	5.5	47
CH_4 Emissions from Landfills	CH_4	161.0	132.0	0.01	5.4	52
CO_2 Emissions from Iron and Steel Production	CO_2	84.9	45.2	0.01	5.2	58
Direct N2O Emissions from Agricultural Soil Management	N_2O	310.1	310.5	0.01	4.9	63
Fugitive Emissions from Coal Mining	CH_4	81.9	52.4	<0.01	4.1	67
Fugitive Emissions from Natural Gas Systems	CH_4	124.5	111.1	<0.01	3.3	70
HFC-23 Emissions from HCFC-22 Production	HFCs	35.0	16.5	<0.01	2.3	72
Mobile Combustion: Aviation	CO_2	180.0	186.1	<0.01	2.3	75
CH_4 Emissions from Enteric Fermentation	CH_4	115.7	112.1	<0.01	2.2	77
CO_2 Emissions from Settlements Remaining Settlements	CO_2	57.5	88.5	<0.01	2.1	79

PFC Emissions from Aluminum Production	PFCs	18.5	3.0	<0.01	1.8	81
SF_6 Emissions from Electrical Transmission and Distribution	SF_6	27.1	13.2	<0.01	1.8	82
CO_2 Emissions from Landfilled Yard Trimmings and Food Scraps	CO_2	22.8	8.8	<0.01	1.7	84
CO_2 Emissions from Grassland Remaining Grassland	CO_2	0.1	16.1	<0.01	1.5	86
Mobile Combustion: Road & Other	N_2O	41.6	35.7	<0.01	1.2	87
Indirect N_2O Emissions from Applied Nitrogen	N_2O	56.8	54.6	<0.01	1.1	88
N_2O Emissions from Adipic Acid Production	N_2O	15.2	6.0	<0.01	1.1	89
Fugitive Emissions from Petroleum Systems	CH_4	34.4	28.5	<0.01	1.1	90
CO_2 Emissions from Natural Gas Systems	CO_2	33.7	28.2	<0.01	1.1	91
Mobile Combustion: Marine	CO_2	46.8	63.7	<0.01	0.9	92
CO_2 Emissions from Waste Combustion	CO_2	10.9	20.9	<0.01	0.8	93
CO_2 Emissions from Cement Manufacture	CO_2	33.3	45.9	<0.01	0.7	94
CO_2 Emissions from Cropland Remaining Cropland	CO_2	28.1	39.4	<0.01	0.6	94
CO_2 Emissions from Ammonia Production and Urea Application	CO_2	19.3	16.3	<0.01	0.6	95
CO_2 Emissions from Non-Energy Use of Fuels	CO_2	117.3	142.4	<0.01	0.5	95
CH_4 Emissions from Manure Management	CH_4	30.9	41.3	<0.01	0.5	96
N_2O Emissions from Nitric Acid Production	N_2O	17.8	15.7	<0.01	0.5	96
CO_2 Emissions from Aluminum Production	CO_2	6.8	4.2	<0.01	0.4	97
SF_6 Emissions from Magnesium Production and Processing	SF_6	5.4	2.7	<0.01	0.4	97
CH_4 Emissions from Wastewater Treatment	CH_4	24.8	25.4	<0.01	0.3	97
CH_4 Emissions from Forest Land Remaining Forest Land	CH_4	7.1	11.6	<0.01	0.3	98
CO_2 Emissions from Land Converted to Cropland	CO_2	8.7	7.2	<0.01	0.3	98
Mobile Combustion: Road & Other	CH_4	4.5	2.4	<0.01	0.3	98
Non- CO_2 Emissions from Stationary Combustion	CH_4	8.0	6.9	<0.01	0.2	99
Fugitive Emissions from Abandoned Coal Mines	CH_4	6.0	5.5	<0.01	0.1	99
CH_4 Emissions from Rice Cultivation	CH_4	7.1	6.9	<0.01	0.1	99
CO_2 Emissions from Ferroalloy Production	CO_2	2.2	1.4	<0.01	0.1	99
CO_2 Emissions from Limestone and Dolomite Use	CO_2	5.5	7.4	<0.01	0.1	99
PFC, HFC, and SF_6 Emissions from Semiconductor Manufacture	SF_6	2.9	4.3	<0.01	0.1	99
N_2O Emissions from N_2O Product Usage	N_2O	4.3	4.3	<0.01	0.1	99
CO_2 Emissions from Land Converted to Grassland	CO_2	14.6	16.3	<0.01	0.1	99
CO_2 Emissions from Zinc Production	CO_2	0.9	0.5	<0.01	0.1	99
N_2O Emissions from Forest Land Remaining Forest Land	N_2O	0.8	1.5	<0.01	0.1	99
CO_2 Emissions from Soda Ash Manufacture and Consumption	CO_2	4.1	4.2	<0.01	0.1	99
CH_4 Emissions from Iron and Steel Production	CH_4	1.3	1.0	<0.01	0.1	99
N_2O Emissions from Wastewater	N_2O	6.4	8.0	<0.01	0.1	100
Non- CO_2 Emissions from Stationary Combustion	N_2O	12.3	13.8	<0.01	0.1	100
N_2O Emissions from Manure Management	N_2O	8.6	9.5	<0.01	0.1	100
CO_2 Emissions from Lime Manufacture	CO_2	11.3	13.7	<0.01	0.0	100
CO_2 Emissions from Phosphoric Acid Production	CO_2	1.5	1.4	<0.01	0.0	100
CO_2 Emissions from Titanium Dioxide Production	CO_2	1.3	1.9	<0.01	0.0	100
CO_2 Emissions from Forest Land Remaining Forest Land	CO_2	598.5	698.7	<0.01	0.0	100
CO_2 Emissions from Carbon Dioxide Consumption	CO_2	1.4	1.3	<0.01	0.0	100
CO_2 Emissions from Petrochemical Production	CO_2	2.2	2.9	<0.01	0.0	100
CO_2 Emissions from Silicon Carbide Production and Consumption	CO_2	0.4	0.2	<0.01	0.0	100
Mobile Combustion: Aviation	N_2O	1.7	1.8	<0.01	0.0	100
N_2O Emissions from Settlements Remaining Settlements	N_2O	5.1	5.8	<0.01	0.0	100
N_2O Emissions from Waste Combustion	N_2O	0.5	0.4	<0.01	0.0	100
CO_2 Emissions from Stationary Combustion - Gas	CO_2	975.4	1138.2	<0.01	0.0	100

CO_2 Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	0.4	<0.01	0.0	100
N_2O Emissions from Field Burning of Agricultural Residues	N_2O	0.4	0.5	<0.01	0.0	100
CH_4 Emissions from Petrochemical Production	CH_4	0.9	1.1	<0.01	0.0	100
CO_2 Emissions from Lead Production	CO_2	0.3	0.3	<0.01	0.0	100
Mobile Combustion: Marine	N_2O	0.4	0.5	<0.01	0.0	100
CH_4 Emissions from Field Burning of Agricultural Residues	CH_4	0.7	0.9	<0.01	0.0	100
Mobile Combustion: Aviation	CH_4	0.2	0.1	<0.01	0.0	100
CH_4 Emissions from Silicon Carbide Production and Consumption	CH_4	+	+	<0.01	0.0	100
Mobile Combustion: Marine	CH_4	0.1	0.1	<0.01	0.0	100
CH_4 Emissions from Ferroalloy Production	CH_4	+	+	<0.01	0.0	100
Total		**6972.4**	**8135.5**	**0.1**	**100.0**	

References

Flugsrud, K., W. Irving, and K. Rypdal (1999) Methodological Choice in Inventory Preparation. Suggestions for Good Practice Guidance. Statistics Norway Department of Economic Statistics. 1999/19.

IPCC (2000) *Good Practice Guidance* and Uncertainty Management in National Greenhouse Gas Inventories, Intergovernmental Panel on Climate Change, National Greenhouse Gas Inventories Programme.